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16APR02 E711327-1 C13678
P01/7700 0.00-0208660.1

16 APR 2002

Request for grant of a patent

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1. Your reference
WOW SADDLE TREE

2. Patent application number
(The Patent Office will fill in this part)
0208660.1 16 APR 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*
(1) DAVID KEMPSELL & (2) MARGARET WHITE
LITTLE DUSKIN FARM, COVET LANE, KINGSTON
CANTERBURY, CT4 6JS KENT

Patents ADP number *(if you know it)*
(1) 6[illegible]0325002

If the applicant is a corporate body, give the country/state of its incorporation
(2) 7029820002

4. Title of the invention
IMPROVEMENTS IN OR RELATING TO SADDLE TREES

5. Name of your agent *(if you have one)*
—

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*
LITTLE DUSKIN FARM
COVET LANE
KINGSTON
CANTERBURY
KENT CT4 6JS

Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country | Priority application number *(if you know it)* | *(day*
N/A.

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application | *(day*
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*
a) any applicant named in part 3 is not an inventor, or
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9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	NONE
Description	6
Claim(s)	NONE
Abstract	NONE
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Priority documents	NONE
Translations of priority documents	NONE
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	NONE
Request for preliminary examination and search *(Patents Form 9/77)*	NONE
Request for substantive examination *(Patents Form 10/77)*	NONE
Any other documents *(please specify)*	NONE

11. I/We request the grant of a patent on the basis ol

Signature

Date 15 APRIL 02.

12. Name and daytime telephone number of person to contact in the United Kingdom DAVID KEMPSELL or MAGGIE WHITE 01227 831 614.

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Improvements in or relating to Saddle Trees

The present invention relates to improvements in or relating to an English saddle tree, particularly for horses.

The tree of a saddle (hereafter referred to as the tree) is the structure or frame on which the component parts of the saddle are affixed. It is the foundation of the saddle and is therefore dictates the final look and fit of the finished saddle. The tree performs many different functions...

a. It is a relatively solid structure, which is used to transfer the weight of the rider evenly over the horses back via two padded panels either side of the horse's backbone. Using a tree ensures the area of bearing surface on the horse is much larger than if the rider were to sit on the horse bare back and therefore this larger area exerts less average pressure on the horse's back.
b. It allows for the formation of an arch, which holds up the seat clear of the withers, the spiny protuberance of the horse's spine under and in front of the front of the saddle. This arch will bridge the spine roughly 5cm behind the end of scapula.
c. It allows the saddler to construct a seat for the rider, normally of foam or some other soft medium suitable for the comfort of the rider.
d. It allows for the solid fixing of the girth straps that allow the girth, a belt like piece of tack, to attach to the saddle's girth straps via buckles on either end it. The girth passes under the horse's rib cage securing to the saddle's girth straps on either side of the saddle so keeping the saddle in place when ridden.
e. It allows for the fixing of stirrup bars. These are hook like metal components that the stirrup leathers loop over. They allow the rider to transfer their weight from the seat of the saddle by standing in the stirrups for rising or posting to the trot or when jumping the horse. The stirrup bar allows the stirrup leathers to slide off in an emergency i.e. the rider falls but traps their foot in the stirrup and instead of being dragged the stirrup leather pulls off the saddle. The hooks obviously point to the rear of the saddle.
f. It allows for all the leather or other material parts or fabric of the saddle to affix. This is normally with tacks, staples and glue.

Originally all trees were made of wood, normally beach. Now 1.5mm beach ply with 3 layers is used. The tree is built up in layers of this laminate cut to shape and placed on a former to the required thickness, between 6 - 10mm thick. The tree is then reinforced by riveting pieces of metal, normally steel or spring steel to the beach tree. There are British Standards that pertain to the type and thickness of steel and the required number and quality of fixing. It should be noted that to stop parasitic infestation of the wood and subsequent deterioration of it the wood is normally covered in a material soaked in a preparation that forms a coating layer on the tree.

With the advent of the use of plastic many manufacturers have turned away from making trees in the form above and have had moulds made for plastic injection moulding techniques. This is expensive and allows for only one size and therefore requires lots of expensive moulds to be made for the various styles and sizes. Dependent on the properties of the plastics used and their final thickness it is sometime still necessary to reinforce the tree with metal. The main disadvantage for using plastic is that the tree becomes very rigid and heavy. To achieve the same strength as the wooden versions the plastic versions normally have to be thicker.

The main disadvantages of all the above is that the final tree is either heavy and rigid or semi flexible but bulked up with riveted pieces of metal work. In the semi rigid case it is possible that in use the fixings for the metal reinforcement work themselves loose. Another disadvantage is that the metal reinforcement restricts the amount of area available to be fixed to by the use of staple glue and tacks when the saddle is built.

Another factor to note is that the front arch of the tree has to fit the horse's back profile in this region of the saddle otherwise excessive pressure will be brought to bear on the horse. This "width fitting" as it is called is the main contributing factor to bad backs in the ridden horse when the wrong fitting is used. It is the same as a human wearing the wrong size of shoe. Manufacturers make a range of width fittings with angles ranging from 80° - 110° in steps of around 4.0° for different shapes of horse. Most saddle arches cannot be

altered in the same way a pair of shoe is only one size. Some manufacturers do have the ability to alter the arch by...

1. Removing the metal reinforcement and replacing it with another of a different width. Normally the fixing for the metal is with approximately 6mm bolts. These bolts are quite bulky and can come loose in use.
2. Bending the arch in a specialized bending tool to the required width. This requires that the metal reinforcement is made of a malleable steel that will be thick and strong enough to hold its position in use until it is adjusted again. The tool required will normally be hydraulic and generate forces capable of lifting 4 tons plus.

In recent years carbon fibre technology has been used for making trees that are very light and strong but the biggest disadvantage is that it is not possible to tack or staple into carbon fibre and this makes the production of conventional English saddles on a commercial basis impossible. This is unfortunate because this material is one of the best things for strength and weight and rigidity that we could employ to make a saddle's tree. Also, if the front arch is made of carbon fibre it is not possible to alter the width of the arch because carbon fibre is inherently rigid and the fitting it is made in will therefore be permanent.

In all cases the main disadvantage we see is that when a horse is in motion the horse's back makes a very different shape to that when standing still. The saddle's tree is made to the shape of a static horse. It would be better for the horse if the tree could twist on its back whilst at the same time still supporting and spreading the riders weight. Most of the movement that exerts pressure on a tree is in the shoulder area of the horse or the scapulas. When a horse is in motion, the scapulas alternately rotate backwards into the area of the horse's back covered by the front arch of the saddle. If it were possible to allow the front arch of the saddle to move with the horse whilst the rear of the saddle could stay stable and in place the rider would feel more stable and the horse would be more free to move. The reason for this conclusion is that we see on saddle damaged horses diagonally opposed trauma i.e. left shoulder region to right thoracic region, which shows one that the saddle is being rocked by the motion of the scapulas.

The ability of the tree to have lateral twisting with longitudinal strength has been achieved in Spanish styles of saddle where tight cylindrical straw bundles are encapsulated between leather to form a corrugated mat. As many as 12 or more bundles are used. The tight straw bundles in the leather mat are difficult to flex front to back along the length of the straw bundles but the mat itself will twist along its length i.e. front of mat turn clockwise and rear of mat turns anti-clockwise. If a saddle is made with this style of mat as the basis of a tree with the bundles running in the same direction as the spine of the horse one achieves a flexible saddle that encourages better movement in the horse by not restricting it with a solid tree. The only problem with this construction is that it is very bulky and cannot be used for English style saddles. Spanish saddles are much bigger and heavier than English saddles.

The disadvantages of the above English style of tree is that they solely form the support structure and have distinct disadvantages when it comes to the pressure they exert on the horse. The tree by definition has to be reasonably rigid to transfer the weight of the rider but where the tree ends, especial at the tree points we see the possibility for pressure points to occur. The tree points are where the tree arch ends on either side of the wither. The points are normally about 40mm - 50mm in width and they orient downward behind the scapula. Because the tree points are as the name suggests points they do cause a point of pressure especially when the arch does not conform to the horse's shape. The stirrup bars are located just behind the points of the tree so when the rider posts, rises out of the saddle or jumps their weight is transferred more to the front of the saddle and therefore increases the pressure on the points of the tree and therefore the horse. The main reason for the point is that it gives a fixing point for the stuffed panel of the saddle that cushions the tree from the horse's back. The tree points locate into a point pocket on the upper side of the panel.

The stirrup bars themselves can also cause pressure points on the horse due to the fact that they have no medium apart from the stuffed panel of the saddle to spread the pressure they exert because they sit directly on top of the panel.

In essence the main problems we see with the conventional English saddle tree is that it is designed as a rigid object to fit a static horse. The tree has the ability to cause numerous different pressure loading points simply because the only thing between these pressure points and the horse's back is the stuffed panel. This alone is not enough to disperse the pressures evenly.

Currently on the market are some saddles that use a flexible panel system that sits either side of the spine along a horse's back instead of a stuffed panel. These saddles still require a tree and the flexible panels fix to the under side of the tree. These fixing points have some form of mechanical adjustment of the ride height of the saddle so the saddle seat sits level on the horse. The flexible panel is normally much larger than the tree and provide a bigger bearing surface than conventional flocked panels otherwise there would be no advantage. The panel is usually made of a semi rigid upper of plastic with foam underneath and the whole panel covered in leather.

The disadvantages are that the finished saddle does not look conventional and is therefore unpopular. The tree has to be elevated from the panels to allow for adjustments to be made for ride height. This elevation has the advantages and disadvantages. The disadvantage being that the rider does sit further away from the horse. By elevating the tree give the advantage of alleviating pressure points due to tree points and stirrup bars but the points of adjustment themselves, normally four, two front, two back, actually cause their own pressure points. The load will push down into the flexible panel at these locations and because by definition the panel is flexible the pressure on these points clasp through the panel. Whilst some what dispersed they still give loaded area to the horse's back rather than a constant evenly pressure. As the horse moves the flexible panel produces higher pressures in the region where the panel are fixed to the tree.

We shall illustrate that The present invention is unique in the manufacture of an English saddle tree bearing in mind the above in the following ways...

1. the tree will allow fixing to be made to the tree by tacking, staples and glue.
2. the tree will have the ability to twist and flex with the horse movement laterally.
3. the tree will have longitudinal strength to spread the riders weight evenly along the horse's back.
4. the tree will not have points so alleviating point pressure associated with conventional tree points.
5. the tree will disperse the pressures from the stirrup bars over a much greater area.
6. the tree will extend the pressure from the rider over a much greater area than the saddle tree would achieve by itself whilst not creating loading (pressure) points.
7. the tree will have a method of reinforcing the front arch that can be changed when required. The method of construction of the tree will mean that this reinforcement becomes an integral part of the tree not being affix by rivets etc and adds no bulk to the tree.

The present inventions will be a synergy of the best points of English, Spanish and flexible panel systems on a commercial sound basis. The outward appearance of the saddle will not be different to the popular conventional saddle sold currently but its' performance will be radically different as the horse will be freer and looser in its back and have less (average) pressure exerted on its' musculature.

The above and other aspects of the present invention will now be illustrated in further detail, by way of example only, with reference to the accompanying figures in which:

Figure 1 illustrates a conventional English style saddle in a side view;

Figure 2 illustrates a conventional English saddle in exploded view;

Figure 3 illustrates an English Saddle tree complete;

Figure 4 illustrates an English Saddle tree exploded;

Figure 5 illustrates the embodiment of the invention viewed from above (left side shows hidden detail of stirrup bar, right side shows shape of tree with no extension plates shown);

Figure 6 illustrates the embodiment of the invention viewed from underneath without extension plates;

Figure 7 illustrates the embodiment of the invention viewed from underneath with extension plates (right side shown with extension plates solid, left side extension plates are shown transparent);

Figure 8 illustrates the left hand side saddle panel and flap (viewed from above) showing the extension plates interlocking and how they become part of the panel of the saddle, mirror image for right hand panel;

Figure 9 illustrates the profiles across a horse's back at the points of the tree, the middle of where a saddle sits and the rear of the saddle.

To illustrate the present invention, it is convenient to outline the construction of a conventional saddle trees with reference to Figures 1-4. Note that whilst only wooden construction of trees 20 is illustrated the general shape and design of the tree does not differ significantly when in plastic. If the wooden parts 28 and 3 of a tree 20 were moulded in plastic rather than wood one would still require all the same component parts and construction to attain rigidity. Only when a moulded tree does not have the void 24 in the center of the tree 20 is the use of reinforcement metal 26 & 27 negated. This creates a solid tree, which is heavier than the original.

The tree body 28 and cantle 3 form the entirety of the solid or semi solid structure that transfers the weight of rider. As one can see this shape is irregular and the potential to cause pressure points is enhanced. The panel 5 is placed directly under the tree 20 as shown by figure 2 and it is the flocking (wool or similar material contained within the panel that contours to the horse and the underside of the tree making up the difference between the two shapes. In use the tree will work into the flocking compressing it in some places and not in others causing unevenness and pressure points.

The reinforcing metal 26 & 27 adds to the rigidity of the tree 20 and makes it possible to only slightly move or twist the tree along its length.

The stirrup bars 22 hang under the tree 20 in the region of the tree 20 that runs parallel to the spine of the horse and arch 23. The metal reinforcement 26 and 27 plus the head plate 21 provide the solid anchor points for the stirrup bars 22 and the total mass of metal in this part of the tree 20 makes the tree 20 total rigid in this region. This is the place in the tree 20 where the horse actually requires the most articulation due to the movement of the shoulders of the horse.

For ease of explanation we shall explain each point of uniqueness as laid out above. With reference to all figures.

Point 1 "fixing to be made to the tree by tacking, staples and glue"

The tree 100 will be substantially made of a polyurethane resin that is flexible having a Shore hardness of around 90 on the "A" scale. The resin is an excellent medium for fixing material to by staples, tacks and glue. The resin is easily cast using simple pour moulding techniques. The design of the tree 100 will ensure that all portions of the tree 100 that require materials affixed will be polyurethane resin.

Point 2 "the ability to twist and flex with the horse movement laterally" & Point 3 "longitudinal strength to spread the riders weight evenly along the horse's back"

The moulds are simple 2 part silicon moulds, which allows for the introduction of other components into the mould for encapsulation in the polyurethane resin. The components that are to be moulded into the resin must obviously be clean and dry and prepared with solutions that will allow a strong bond between the resin and the various components. Shellac is a recognised bond-enhancing agent for this purpose. Polyurethane itself is a very strong adhesive as long as the surface it is bonding to is correctly prepared the components will unify.

In this way we can introduce into the moulded tree 100 carbon fibre bars 123 which as previously stated are excellent for application of saddles but are no good when used to build a whole tree. The polyurethane tree 100 being flexible without these bars would be capable of being folded in half. The carbon fibre bars 123 run longitudinally in the same way as the straw in a Spanish saddle and act in the same manner. The carbon fibre bar 123 will be a minimum of 6mm thick and roughly 30mm wide and will be as strong as steel but with minimal weight. It will be practically impossible in normal use for the bar to flex longitudinally however because the connecting material between the bar is the polyurethane the tree will be capable of flexing or twisting laterally. Most of the articulation will be in the region adjacent to where the carbon fibre bars and the head plate 121 are closest. The gap 126 between the head plate 121 and the carbon fibre bars 123 will dictate the amount of flexibility attained. It would also be possible to introduce a single layer of bi-directional carbon fibre sheet 122 to ensure integrity between components and also control stiffness. The carbon fibre sheet's 122 size and shape can be tailored to ensure that there is some resistance to excessive twisting and reinforce the polyurethane against wear of the girth strap holes 106. These holes 106 are used to locate the girth strap nylon webbing (not illustrated). 25mm nylon webbing can weave up through one hole

106 from the underside of the saddle tree 100 and down through the adjacent hole 106 on the opposite side of the tree 100. The web is prevented from slipping by screws, which are located between the holes 106 through the web and into the tree 100 (not illustrated) in this way there is a secure mounting point for the attachment of the leather girth straps 8.

Point 4 "not have points so alleviating point pressure associated with conventional tree points"

As best illustrated in Figure 5 the tree 100 will not have conventional tree points 25, which would normally, be located at the ends of the head plate 121 instead the tree forms a lobe incorporating the head plate 121 and the stirrup bar 124. This will give a bigger and better bearing surface for the rider's weight to disperse over.

Point 5 "the tree will disperse the pressures from the stirrup bars over a much greater area"

The stirrup bars 124 are rebated into a recess 127 under the tree 100 (figure 6) and help to ensure the flat profile to the underside of the tree 100. To ensure that the stirrups 10 and stirrup bars 124 do not cause pressure points a 1.5mm thick polypropylene shaped sheet, Front Plate 101, which is flexible but supportive is riveted 104 to the head plate 121 on the underside of the tree 100. These Front Plates 101 cover the stirrup bars 124 and sitting between the stirrup bars 22 and the top of the panel disperse of the pressures created by the bars 124 and stirrup leathers 10. They also are shaped so they will locate into a "pocket" that is formed by Panel Plate 103. Panel Plate 103 is an integral part of the panel top. There is no space between the plate and the tree or the plate and the panel top.

Point 6 "The tree will extend the pressure from the rider over a much greater area than the saddle tree would achieve by itself"

The stitch line 107 defines the flocked area 134 of the panel 130. The area to the right hand of 107 is flocked. The flap area is defined by all material to the left of line 107. In conventional riding saddles it is only the flocked area 5 can only transfer the weight of the rider under the area that is covered by the tree 20.

In the present invention the panel 130 is predominantly made of 3 pieces of leather or fabric. Two pieces generally the same shape and conforming to the outline of panel 130. To add height and a third dimension to what would otherwise be a flat panel a gusset 132 is incorporated in the panel 130. The upper surface of the panel 130 is made of a thicker more substantial material than the panel bottom. The panel is stitch together all the way around its outer edge. The leather is glued together in the flap region 133 to the left of the stitch line 107 to make a flat pliable surface for the rider leg to rest against. The stitch line 107 defines the final shape of the padded part of the panel 130. The pocket that is formed to the right of the stitch line 107 is filled with wool or materials suitable for padding the horses back from the tree.

The plates Front Plate 101, Back Plate 102 & Panel Plate 103 are all made of 1.5mm polypropylene. The shapes of these plates play a role in shaping the panel especially Panel Plate 103 that is stitched to the top of the panel 130 so that whilst stiffening and increasing bearing surface it does not lessen the contact of the riders leg with the horse. Note the shape of plate Panel Plate 103 when in position is actually twisted from front to back as it follows the tree shape and the horse's back. In figure 9 one can see how the horse's back is nearer the vertical at the wither 44 and progressively becomes nearer the horizontal as we progress back through the middle of the saddle 45 to the back of the saddle 46. The twist in Panel Plate 103 in conjunction with the panel draw the plate flat to the horse where the riders leg sits on the saddle flap 133 and promotes a close feeling for the rider.

Extension plates 101, 102 & 103 are used to further disperse the pressure of rider and saddle acting as a flexible extension of the tree 100 whilst also forming fixing points the panel 130 below. Because the plates 101, 102 & 103 themselves are the entirety of the fixtures and extensions to the tree 100 they do not cause unnecessary bulk or elevation from the horse.

The combination of the three plates 101, 102 & 103 cover the saddles panels 134 completely and can even extended further than the stuffed region 134 in this way the creation of pressure points is significantly reduced from that of other systems of pressure dispersal. The Plates 101, 102 & 103 will flex with the horse's movement and the combination of the panel 134 and plates 101, 102 & 103 in conjunction with the tree 100 and the flexing of the arch 23 will give a stable but fluid bearing surface on the horse.

Panel Plate 103 is attached to the panel 130 in its' construction by being stitched on the line 107 and where it meets the outer front edge of the panel 130. This has the effect of firstly stiffening the leather upper of panel 130 but not making it rigid. Second by positioning the stitch line 107 as shown in figure 8 Panel Plate 103 forms a pocket for Front Plate 101 to slide into. As we move from the edge of the tree 100 in the region of the end of the head plate 121 and stirrup bars 124 the two plates overlap one another making the effective working thickness 3mm. As we move farther away from the tree the overlap finishes and a single plate Panel Plate 103 is all that stiffens the top of the panel. In this way we increase the bearing surface by extending a semi-rigid bearing surface out much farther than the reach of the tree 100. The bearing surface does not just end in a hard unyielding point as conventional saddles but rather fades kindly out the further away we get from the tree.

At the back of the saddle the Back Plate 102 slides inside the upper surface of the panel top by entering the panel through an unusually shaped slot 131 which allows for the fixing points of the Back Plate 102. Back Plate 102 can be made to the size of the panel top, which in turn can be made much larger than the tree if required and therefore extend the bearing surface at the back of the tree as outboard.

Whilst the construction of this saddle is very different from anything currently on the market the outward appearance of the saddle looks conventional. This point alone means that it is marketable whilst being capable of distinct advantages in the way it performs.

Point 7 "the tree will have a method of reinforcing the front arch that can be changed when required. The method of construction of the tree will mean that this reinforcement becomes an integral part of the tree not being affix by rivets etc and adds no bulk to the tree"

Most trees have a head plate 21 which reinforces the front arch 23 under which the wither 44 (fig.9) of the horse sits. In most cases whether wooden or plastic based there are two steel plates of around 2.0mm – 2.5mm in thickness that make up the head plate 21 one on the upper surface of the arch 23 and one on the underside. These plates are riveted together through the tree body 28 at the head 23. The problem with this is the head plates cannot be adjusted to any great extent i.e. the width between the point of tree 25 cannot be made greater or smaller or there is a chance one would loosen the rivets and weaken the construction. Increasing and decreasing the width between the points and therefore the their relative angle is necessary to fit different shapes of horse. With this type of construction of tree it is considered that the tree is of one fit and cannot be change without invalidating the any manufacturers warranty there might be on the tree itself.

Another construction involves using only the underneath plate 21 which is much thicker i.e. 10mm at the arch 23 and normally tapers to 2mm at the points 25. This style of plate is made from a malleable steel and can be bent to any shape within reason one should require to fit a horse. This is the preferred method for the present invention. A specialised press is required to bend the head plate 21, as the forces required are large being in the region of 2–4 tons. Whilst this prior art works well, in practice the plate 21 is still riveted to tree body 28 and therefore stresses are still exerted on these fixings. In the embodiment of the invention it is the intention to mould a malleable steel head plate 21 into the tree 100 so that it is encapsulated in the polyurethane resin becoming an integrated bonded part of the whole tree 100. This will also mean that the tree will be smooth on its underside, the less bumps and lumps means the less likelihood of a pressure point occurring.

It is only by this method of moulding that the polyurethane's characteristics can be changed in different regions of the tree by the incorporation of components that when interacting on a moving horse with a rider mounted will not impede the horse or feel different for the rider. This is achieved, whilst dispersing the pressure created over a much larger area, removing pressure points which create back problems for the horse.

Figure 1

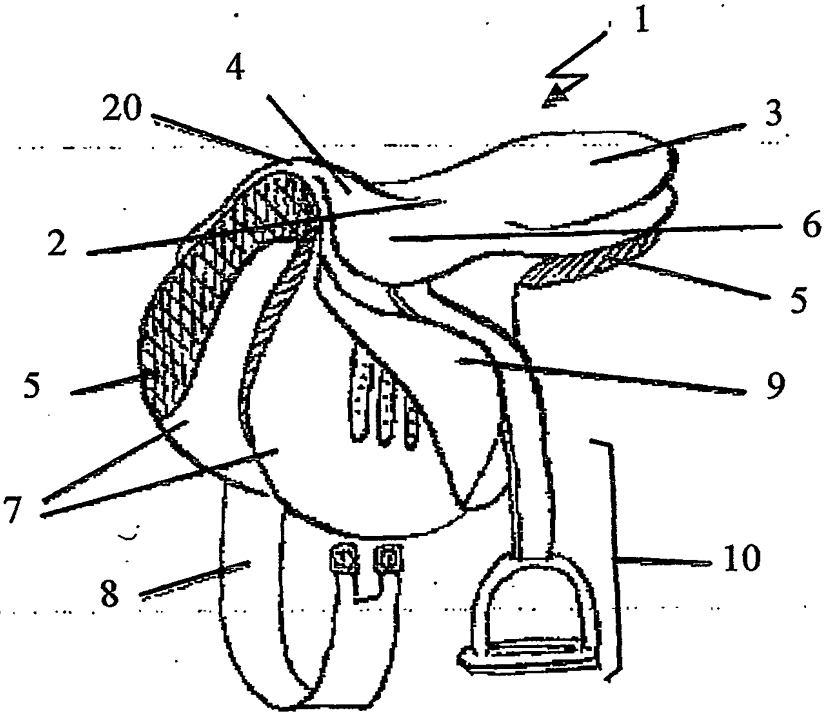

Figure 2

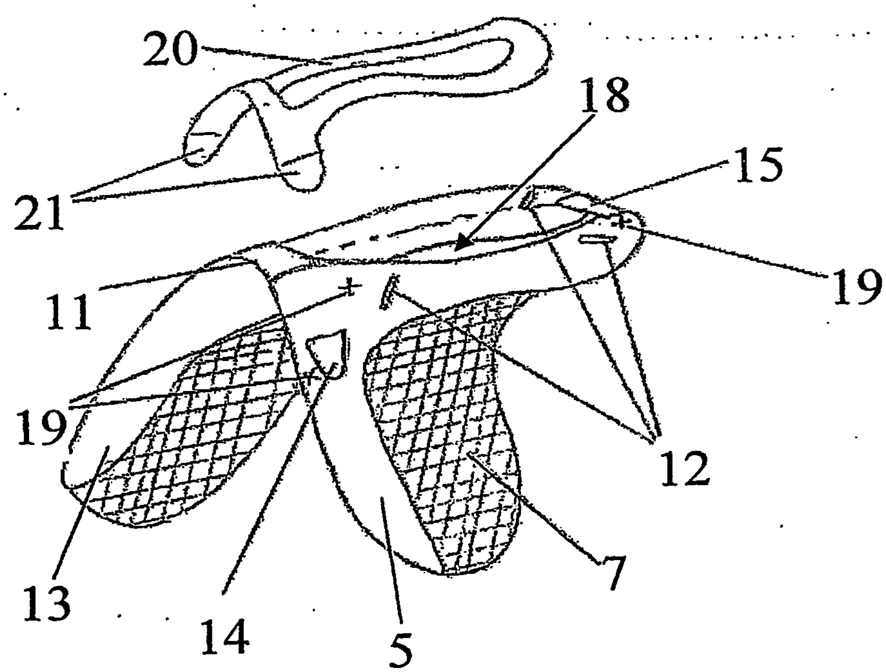

Figure 3

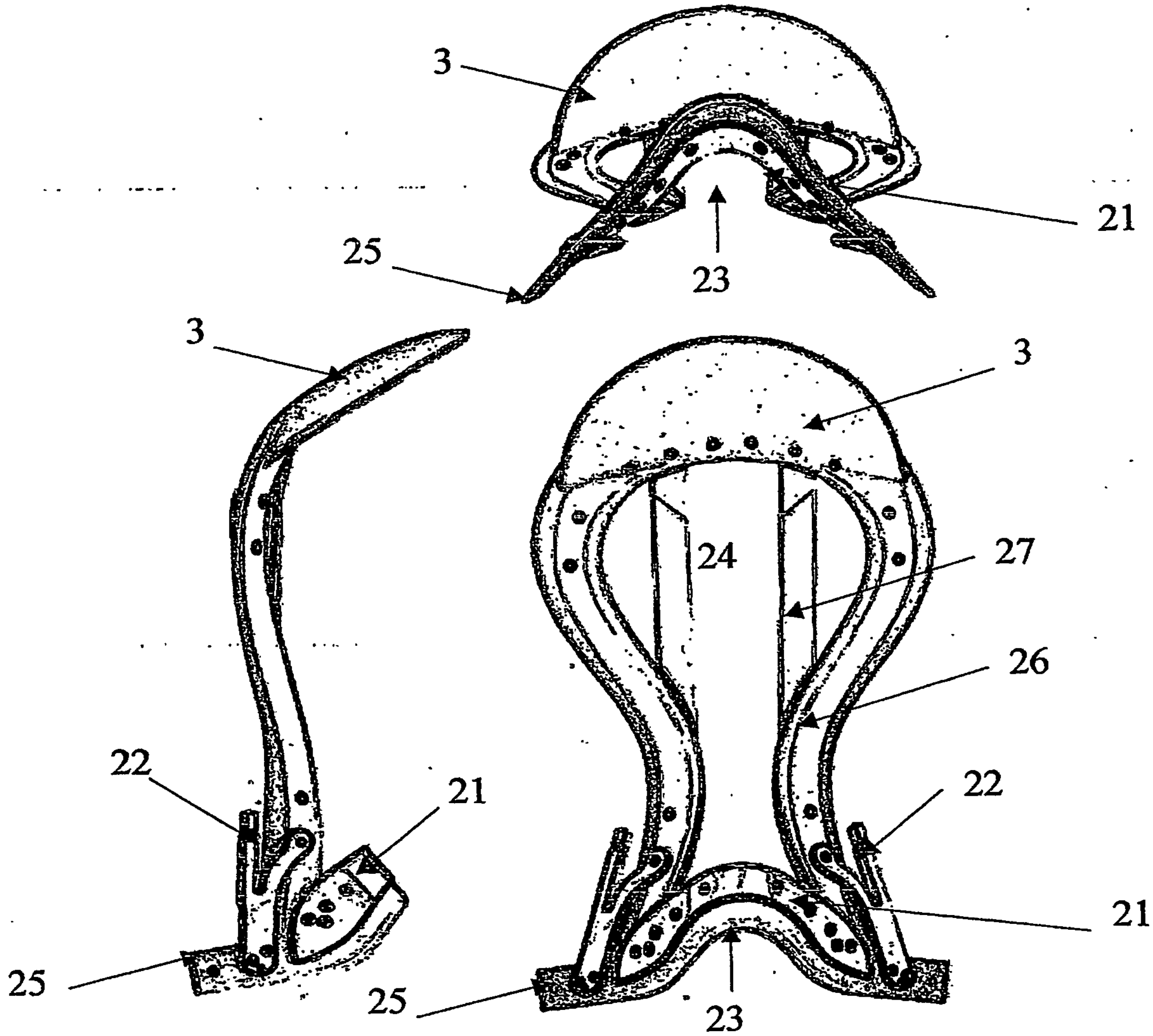

Figure 4

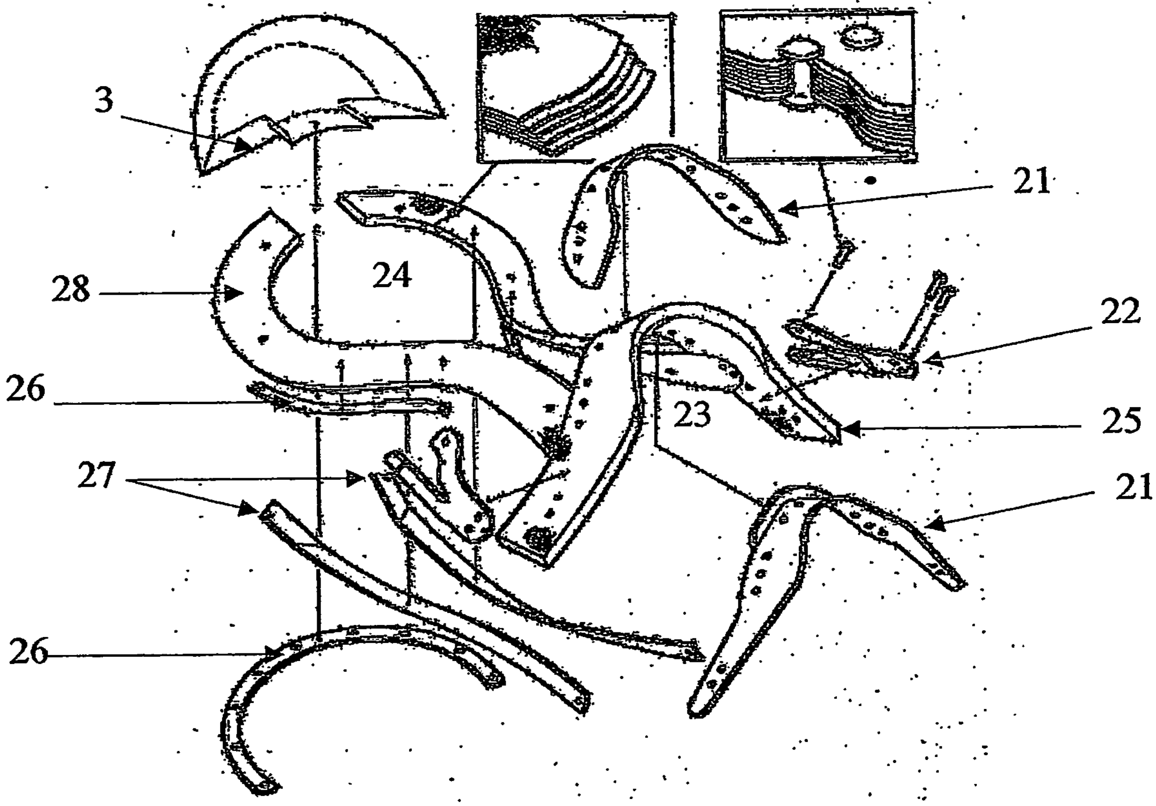

Figure 5

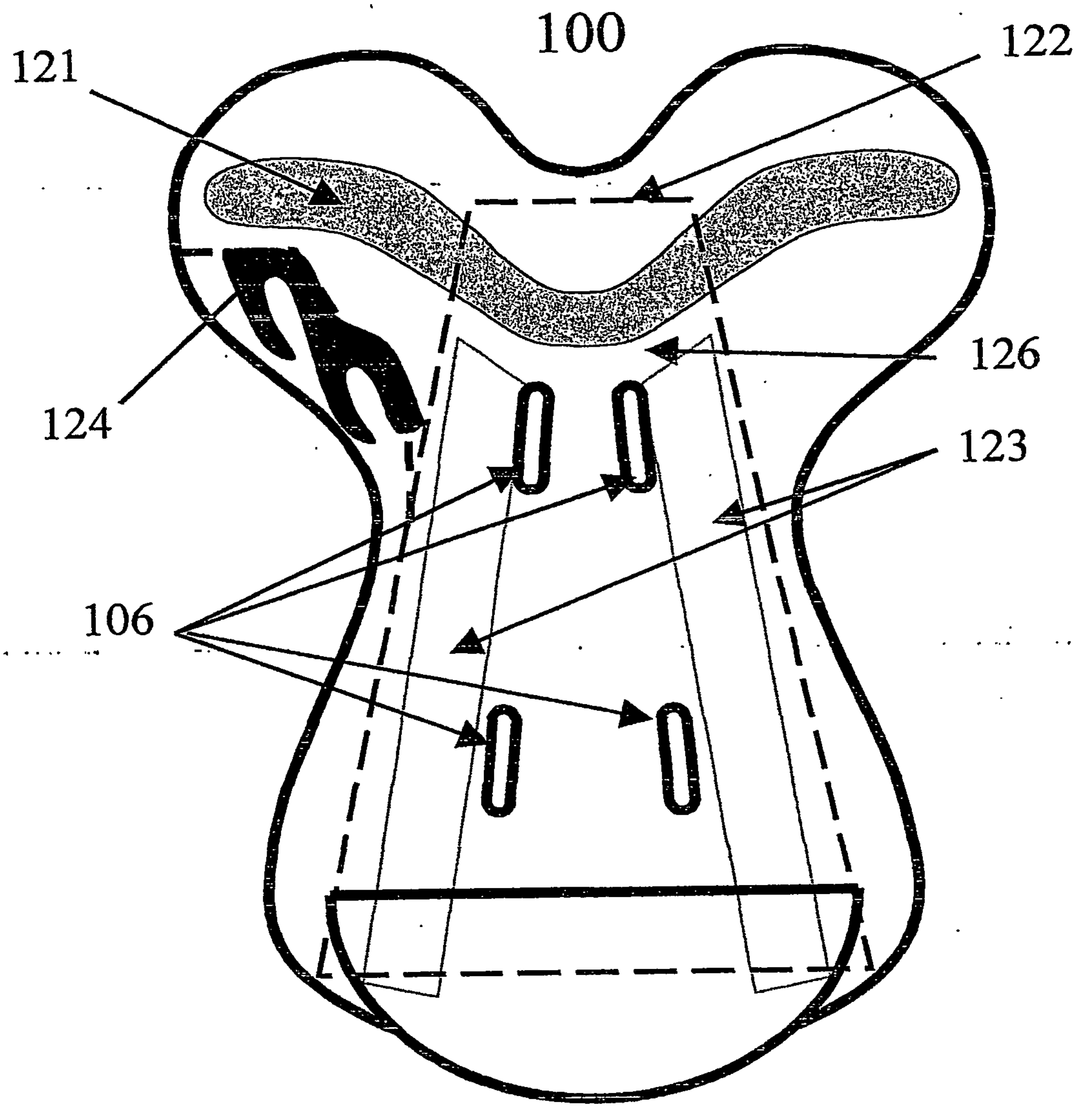

Figure 6

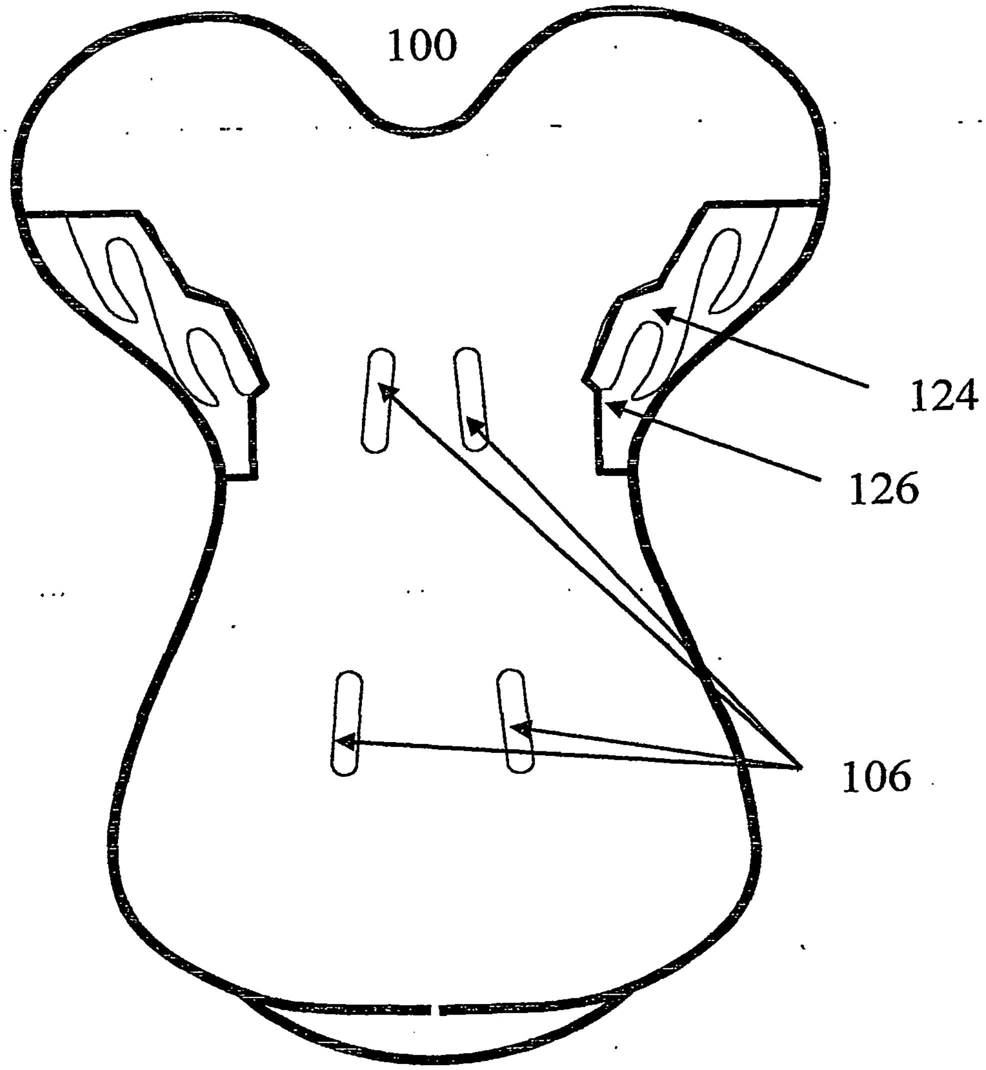

Figure 7

100

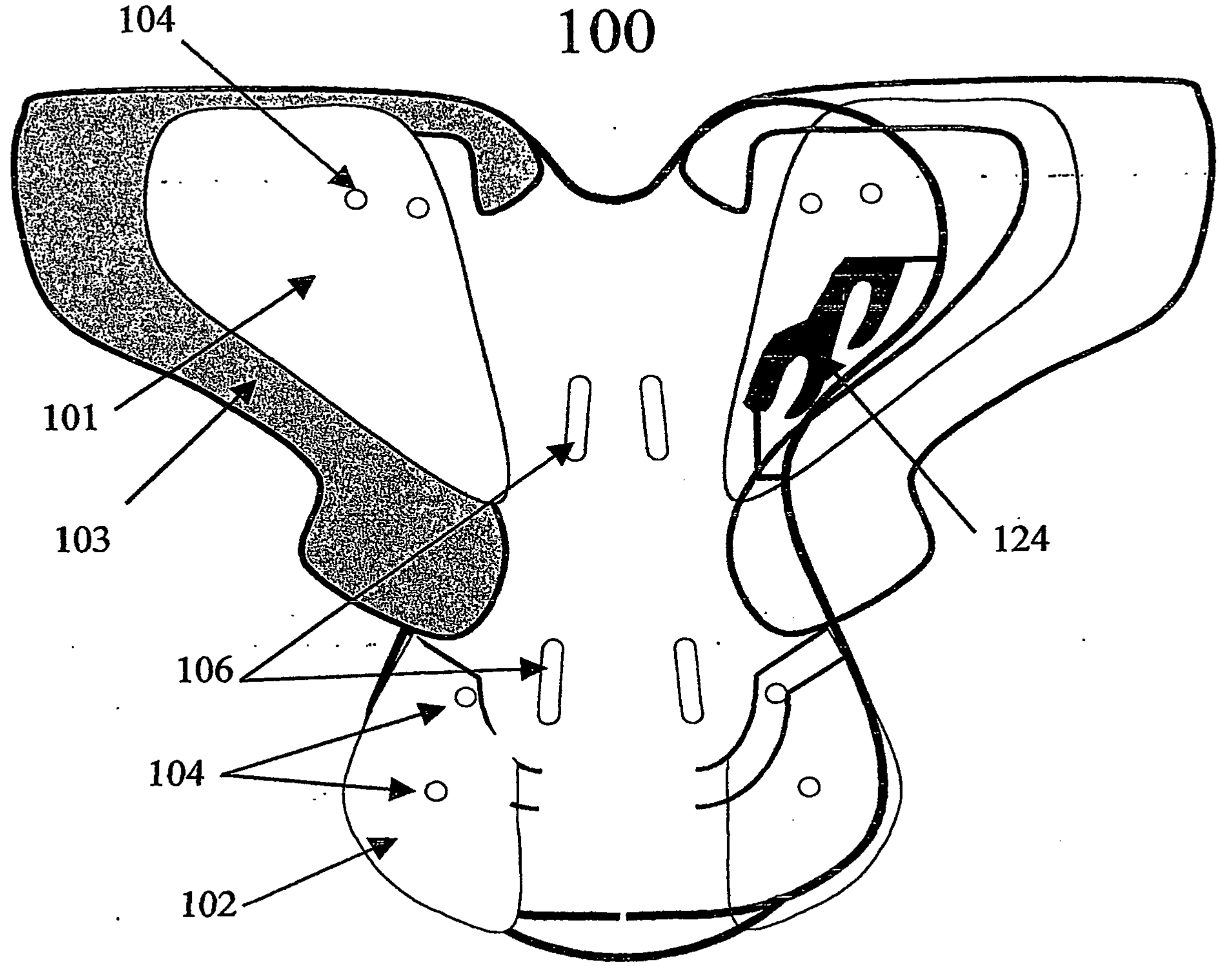

Figure 8

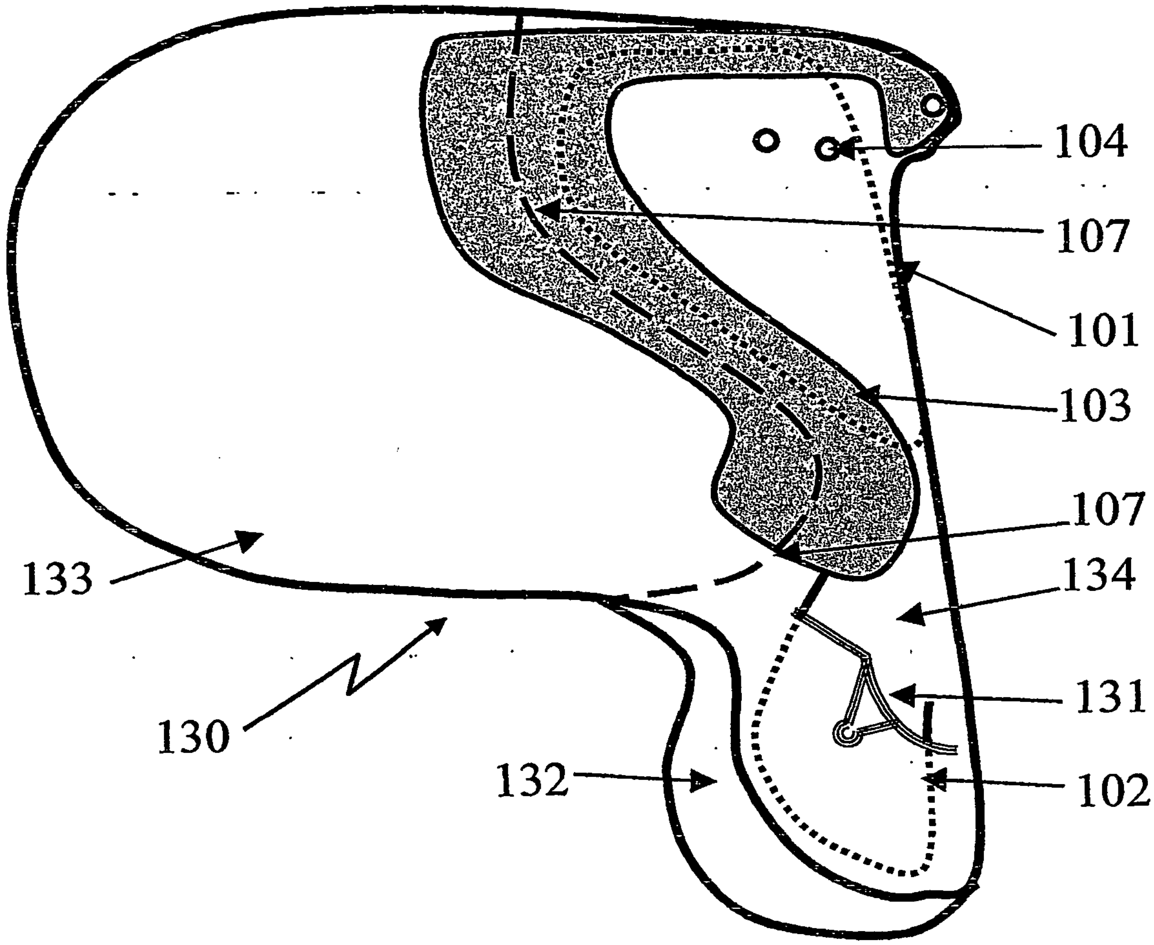

Figure 9